REMARKS

Reconsideration of the application as amended is respectfully requested.

The Office Action

Claims 1-16 were presented for examination. Claims 1-4, 7-11, 14 and 17 are now in the case. Claims 1, 4, 7, 8, 11 and 14 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Parker et al. (U.S. Patent 6,121,732). Claims 2, 3, 9 and 10 stand rejected as unpatentable over Parker et al. (U.S. Patent 6,121,732) in view of Sullivan et al. (U.S. Patent 5, 001, 386).

Claims 1, 2, 4, 9 and 11 have been amended. Claims 5, 6, 12, 13, 15 and 16 have been canceled. Claim 17 has been added.

The 102(e) Rejections

Claims 1, 4, 7, 8, 11 and 14 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Parker et al. (U.S. Patent 6,121,732).

The rejection of Claim 1 is overcome since it is believed that claim 1, as amended, patentably distinguishes from Parker.

It is alleged that Parker discloses an inverter circuit, configured in operative connection with the DC bus, configured to generate an asymmetric alternating current on a lamp input line; and a gas discharge lamp in operative connection to the lamp input line to receive the asymmetric alternative current. In fact, Parker discloses an inverter circuit 54 which is operatively connected to a step-up transformer 56 (Figures 5 and 6). The step-up transformer is stepping up the voltage to an appropriate level for driving the lamp (Abstract) and is operatively connected to the lamp input line (Figures 5 and 6). Therefore, the inverter circuit in Parker is not directly connected to the lamp power input line, but rather is connected to the step-up transformer. Claim 1 recites "the inverter circuit being connected directly to the lamp input line", thus providing power to the discharge lamp without a need for a step-up transformer. Support for the above-quoted recitation is found in figure 3, which depicts that the output wires of the inverter circuit 30 connected directly to the lamp input line wires 32, in paragraph 13, at lines 5-7, and in paragraph 7, lines 7-8.

Next, Parker's invention is directed to establishing an asymmetrical DC voltage across the neon lamp to prevent formation of bubbles (Column 3, lines 37-39). The Applicant's invention is directed to generating the asymmetric alternating current and applying this current to the fluorescent lamp to eliminate otherwise occurring striations. The average DC voltage applied to the lamp is zero. Nowhere does Parker disclose applying asymmetric alternating current across the lamp to eliminate striations otherwise occurring in the lamp.

Particularly, the present invention does not produce a DC voltage as the circuit is driving a fluorescent lamp and not a neon lamp. The models for these lamps are quite different. The fluorescent lamp looks like a resistance, whereas the neon looks like zener diodes in series with a resistor. Since the circuit of the application does not produce a DC voltage or a DC current, it eliminates striations by introducing additional even harmonics, i.e. 2^{nd}, 4^{th}, etc. Thus, we do not generate a DC current, but rather an asymmetric waveform.

Thus, Parker teaches eliminating striations by applying a DC voltage to the neon lamp through duty cycle control. A concept of present application teaches eliminating striations by introducing additional harmonics.

Therefore, Claim 1 distinguishes from Parker.

Claims 4 and 7 were rejected like claim 1 under 35 U.S.C. § 102(e) as being anticipated by Parker et al. (U.S. Patent 6,121,732). As claims 4 and 7 depend from and further define now distinguished claim 1, it is submitted that claims 4 and 7 are also distinguished.

In addition to Claim 4 being distinguished in view of its relationship to claim 1, Claim 4 has been further amended. Claim 4, as amended, recites that "the inverter circuit includes... back-to-back, series connected zener diodes bridging the gate and source terminals of the MOSFETs, the zener diodes being configured with unequal voltage values from each other causing the MOSFETs to have unequal on times." The support for the above-quoted recitation is found in specification in paragraph 17, at lines 5-6 and in paragraph 18, at lines 3-6. Nowhere does Parker disclose the use of zener diodes such that to configure them with

unequal voltage values from each other to cause the MOSFETs to have unequal on times. Therefore, Claim 4 distinguishes from Parker.

Claim 8 was rejected under 35 U.S.C. § 102(e) as being anticipated by Parker et al. (U.S. Patent 6,121,732).

The rejection of Claim 8 is overcome since it is believed that Claim 8, as amended, patentably distinguishes from Parker.

Parker discloses an inverter circuit 54 which is operatively connected to a step-up transformer 56 (Figures 5 and 6). The step-up transformer is stepping up the voltage to an appropriate level for driving the lamp (Abstract) and is operatively connected to the lamp input line (Figures 5 and 6). Therefore, the inverter circuit in Parker is not producing the voltage directly on the lamp input line. Rather, the power on the lamp input line is produced by the step-up transformer that is stepping up the voltage to an appropriate level. Claim 8 recites that the asymmetric current is produced directly on the lamp input line by the inverter, thus the power is provided to the lamp without a need for a step-up transformer. Support for the above-quoted recitation is found in figure 3, which depicts that the output wires of the inverter circuit 30 connected directly to the lamp input line wires 32, in paragraph 13, at lines 5-7, and in paragraph 7, lines 7-8.

Next, Parker's invention is directed to establishing an asymmetrical DC voltage across the neon lamp to prevent formation of bubbles (Column 3, lines 37-39). Applicant's claims are directed to supplying the asymmetric alternating current to a gas discharge lamp to eliminate otherwise occurring striations. The average DC voltage applied to the lamp is zero. Nowhere does Parker disclose supplying asymmetric alternating current across the lamp to eliminate striations otherwise occurring in the lamp.

Therefore, Claim 8 distinguishes from Parker.

Claims 11 and 14 were rejected like claim 8 under 35 U.S.C. § 102(e) as being anticipated by Parker et al. (U.S. Patent 6,121,732). As claims 11 and 14 depend from and further define now distinguished claim 8, it is submitted that claims 11 and 14 are also distinguished.

In addition to Claim 11 being distinguished in view of its relationship to claim 8, Claim 11 has been further amended. Claim 11, as amended, recites that "the inverting is performed by a switching network including MOSFET transistor switches; and providing back-to-back, series connected zener diodes bridging the gate and source terminals of the MOSFETs, the zener diodes being configured with unequal voltage values from each other causing the MOSFETs to have unequal on times." The support for the above-quoted recitation is found in specification in paragraph 17, at lines 5-6 and in paragraph 18, at lines 3-6. Nowhere does Parker disclose the use of zener diodes such that to configure them with unequal voltage values from each other to cause the MOSFETs to have unequal on times. Therefore, Claim 11 distinguishes from Parker.

Furthermore, it is believed that the claims as amended define an invention that is unobvious over U.S. patents to Parker, Sullivan or Miyazaki, taken singularly or in combination. The Examiner correctly points out regarding now canceled claims 5-6 and 12-13, that Miyazaki utilizes back to back voltage-limiting zener diodes. However, there is no suggestion or motivation in Miyazaki to use zener diodes with the voltage ratings different from each other in order to produce an asymmetric voltage function. Absent such suggestion, there would be no reason why one skilled in art, who was trying to design a lamp ballast that generates an asymmetric alternating current and who had no prior knowledge of Applicant's claimed invention, would consult Parker and Miyazaki. Neither of the references suggests the combination recited in the claims.

The 103(a) Rejections

Claims 2, 3, 9 and 10 were rejected as unpatentable over Parker et al. (U.S. Patent 6,121,732) in view of Sullivan et al. (U.S. Patent 5, 001, 386).

Concepts of present invention are directed to producing an asymmetric alternating current on a lamp input line and supplying this current to a gas discharge lamp, thereby eliminating visual striations otherwise occurring in the fluorescent lamp (Paragraph 7, lines 5-8). A blocking capacitor is used to block the DC current (Paragraph 16, lines 8-9). The asymmetric voltage function may be achieved by configuring the transistor switches to have unequal on times or using MOSFETS and utilizing the zener diodes with the voltage ratings different from each other.

Parker teaches to supply an asymmetric DC offset voltage to the neon lamp to eliminate bubbles (Column 3, lines 31-37). Parker is not concerned with the means for establishing the asymmetric alternating current across the lamp. Moreover, by teaching to cure bubbles with the DC voltage, Parker teaches away from the concepts of Applicant's invention.

Sullivan discloses a circuitry for eliminating striations by injecting a DC component. The inverter circuit utilizes transistor switches. Sullivan is not concerned with producing an asymmetric voltage function. In fact, by teaching to inject the DC component, Sullivan, just like Parker, teaches away from the concepts of Applicant's invention.

Initially, Applicant submits that (a) because claims 2 and 3 depend from and further define now distinguished claim 1, claims 2 and 3 are also patentably distinguished from Parker and (b) because claims 9 and 10 depend from and further define now distinguished claim 8, claims 9 and 10 are also patentably distinguished from Parker.

Next, in regards to claims 2 and 9, Applicant submits there is no suggestion in either Parker or Sullivan that they be combined to produce the asymmetric alternating current by configuring the transistors with unequal on times. Absent such suggestion, there would be no reason why one skilled in art, who was trying to design a lamp ballast that generates an asymmetric alternating current and who had no prior knowledge of Applicant's claimed invention, would consult Parker and Sullivan. Applicant was the first to recognize the advantage of such design.

Claims 2 and 9 have been amended to recite that "the bipolar junction transistors are configured to have unequal on times for producing an asymmetry in the alternating current." The support for the above-quoted recitation is found in paragraph 14, lines 25-29). Since neither of the references discloses the above-quoted limitation, Claims 2 and 9 are patentable over references.

As claim 3 depends from and further define now distinguished claim 2, it is submitted that claim 3 is also distinguished.

As claim 10 depends from and further define now distinguished claim 9, it is submitted that claim 10 is also distinguished.

New claim 17 has been added to alternatively set forth the distinguishing aspects of the present application, without introducing new subject matter.

Applicant has reviewed additional art cited but not applied. As it is felt that the applied art is more relevant to the application, Applicant will not burden the record with a further discussion of this art.

No fee is currently due.

CONCLUSION

On the basis of the above amendments and remarks, reconsideration of this application and its early allowance are requested.

Respectfully submitted,
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Attachment: Version With Markings To Show Changes Made

CERTIFICATE OF MAILING

I hereby certify that this Amendment B is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231, on January 13, 2002.

By
Karen M. Forsyth

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Please amend claim 1 as follows:

1. (Amended) A ballast circuit powered by an AC-to-DC converter in operative connection with an input power source, the AC-to-DC converter being configured to produce a DC voltage, the ballast circuit comprising:

a DC bus in operative connection with [said] the AC-to-DC converter, configured to receive the DC voltage;

an inverter circuit configured in operative connection with the DC bus and with a lamp input line, configured to generate an asymmetric alternating current on the lamp input line, the inverter circuit being connected directly to the lamp input line; and

[a gas discharge lamp in operative connection to the lamp input line to receive the asymmetric alternating current.]

wherein the asymmetric alternating current, generated directly on the lamp input line, is provided to a fluorescent lamp being in operative connection with the fluorescent lamp input line to eliminate visual striations otherwise present in the lamp.

Please amend claim 2 as follows:

2. (Amended) The ballast circuit according to claim 1 wherein the inverter circuit includes:

a switching network including bipolar junction transistor switches wherein the bipolar junction transistors are configured to have unequal on times for producing an asymmetry in the alternating current.

Please amend claim 4 as follows:

4. (Amended) The ballast circuit according to claim 1 wherein the inverter circuit includes:

a switching network including MOSFET transistor switches [wherein the MOSFETs are configured to have unequal on times]; and

back-to-back, series connected zener diodes bridging the gate and source terminals of the MOSFETs, the zener diodes being configured with unequal voltage values from each other causing the MOSFETs to have unequal on times.

Please amend claim 8 as follows:

8. (Amended) A method of supplying asymmetric alternating current to a gas discharge lamp from a ballast, the method comprising:

converting an AC voltage from an input power source to produce a DC voltage on a DC bus;

inverting said DC voltage to produce an asymmetric alternating current directly on a lamp input line; and

supplying a gas discharge lamp with the asymmetric alternating current in operative connection with said lamp input line to eliminate visual striations otherwise present in the lamp.

Please amend claim 9 as follows:

9. (Amended) The method according to claim 8 wherein said inverting is performed by a switching network including bipolar junction transistor switches

wherein the bipolar junction transistors are configured to have unequal on times for producing an asymmetry in the alternating current.

Please amend claim 11 as follows:

11. (Amended) The method according to claim 8 wherein said inverting is performed by a switching network including MOSFET transistor switches [wherein the MOSFETs are configured to have unequal on times]; and

providing back-to-back, series connected zener diodes bridging the gate and source terminals of the MOSFETs, the zener diodes being configured with unequal voltage values from each other causing the MOSFETs to have unequal on times.

Please add the following new claim 17:

17. (New) A ballast circuit powered by an AC-to-DC converter in operative connection with an input power source, the AC-to-DC converter being configured to produce a DC voltage, the ballast circuit comprising:

a DC bus in operative connection with the AC-to-DC converter, configured to receive the DC voltage;

an inverter circuit configured in operative connection with the DC bus and with a lamp input line, configured to generate an asymmetric alternating current on the lamp input line, the inverter circuit being connected directly to the lamp input line;

the inverter circuit including one of bipolar junction transistor switches, wherein the bipolar transistor switches are configured to have unequal on times by having unequal h_{FE} values, and MOSFET transistor switches, wherein the MOSFETs are configured to have unequal on times by providing back-to-back, series connected zener diodes bridging the gate and source terminals of the MOSFETs and configured with unequal voltage values from each other;

wherein the asymmetric alternating current, generated directly on the lamp input line, is provided to a fluorescent lamp being in operative connection

with the fluorescent lamp input line to eliminate visual striations otherwise occurring in the lamp.